

# Deaths by Suicide While on Active Duty, Active and Reserve Components, U.S. Armed Forces, 1998-2011

Since 2010, suicide has been the second leading cause of death among U.S. service members, exceeded only by war injury. Suicide mortality rates in the Army and Marine Corps have increased during the conflicts in Iraq and Afghanistan; however, most active duty service members who die by suicide have never deployed. During 1998-2011, 2,990 service members died by suicide while on active duty. Numbers and rates of suicide were highest among service members who were male, in the Army, in their 20s and of white race/ethnicity. Suicide death rates were 24 percent higher among divorced/separated than single, never-married service members. Firearms were the most frequently used method of suicide among both males and females. Numbers and rates of suicide among military members have increased sharply since 2005 and an increasing proportion of suicides were by firearms. When adjusted for age, rates of suicide are somewhat lower among active military members than civilians. There are not well established and clearly effective interventions to prevent suicides – in general or specifically in a military population during wartime.

Since 2010, suicide has been the second leading cause of death among U.S. service members, exceeded only by war injury.<sup>1</sup> Increases in suicide mortality during the past several years have affected the Army more than the other Services; in 2010, 39 percent of active component U.S. military personnel but 53 percent of suicide deaths were Army members. The Services and the Department of Defense (DoD) have focused considerable resources to prevent suicide.<sup>2</sup> The U.S. Air Force has reported success in reducing suicide rates; however the effectiveness of prevention programs has been difficult to measure objectively.<sup>3,4</sup> Ongoing studies continue to seek strategies for preventing suicide and improving mental health among service members.<sup>5</sup>

Suicide among military members is thought to be an impulsive act triggered by one or multiple stressors such as relationship breakups, legal/disciplinary problems, financial difficulties or physical health problems.<sup>6,7</sup> Since 2008, the DoD Suicide Event Report (DoDSER) has summarized numbers, rates and risk factors of fatal and non-fatal suicide events among active duty service members, including detailed information collected for each event.<sup>8</sup> Service

members who die by suicide are more likely than the military population overall to be male, in their 20s and of white, non-Hispanic race/ethnicity. As compared to their respective counterparts, service members who are divorced, of lower military rank and who did not complete high school have higher suicide mortality rates. Approximately 45 percent of suicide decedents have histories of mental health problems; an investigation of suicide deaths during 2003-2009 found that soldiers with behavioral health disorders (e.g., anxiety, depression, substance abuse) had higher suicide rates than soldiers without such disorders.<sup>8,9</sup>

During 2008-2010, of suicide deaths of military members on active duty, 80 percent occurred in the U.S. and 13 percent in Iraq or Afghanistan. Nearly two-thirds of suicides were inflicted by firearms. Of those who died by firearm, nearly three-quarters used personal weapons; however, nearly all of those who died by suicide while deployed to Iraq or Afghanistan used military weapons.<sup>8</sup>

Suicide mortality rates in the Army and Marine Corps have increased since the beginning of Operations Enduring Freedom and Iraqi Freedom. U.S. Army researchers

have suggested that deployment to these conflicts increases a soldier's risk of suicide and have estimated a proportion of suicides that may be related to deployment.<sup>6,10</sup> Such relationships are plausible but difficult to characterize precisely because many correlates of risk for suicide are closely associated with wartime deployments (e.g., access to weapons, high operational tempos, mental health problems). Of note in this regard, the majority (55%) of service members who died by suicide during 2008-2010 had never deployed and 84 percent had no documented combat experiences.<sup>8</sup>

This report summarizes numbers, rates, trends and correlates of risk of deaths by suicide among active duty military members during a 14-year period. It focuses on trends in methods of suicide and includes data through calendar year 2011.

## METHODS

The surveillance period was January 1998-December 2011. The surveillance population included all individuals who served on active duty as a member of the U.S. Army, Navy, Air Force or Marine Corps anytime during the surveillance period. Deaths by suicide of active and reserve component members while serving on active duty were ascertained from records produced by service-specific casualty offices and maintained by the Office of The Armed Forces Medical Examiner (OAFME). These records are routinely provided to the Armed Forces Health Surveillance Center for integration into the Defense Medical Surveillance System. OAFME-assigned "underlying cause of death" codes were used to determine the methods of suicide. Because this report summarized all suicides documented by the OAFME as of 3 April 2012, the numbers of suicides reported here may differ from those reported at other times and by other DoD sources.

Mortality rates were summarized in relation to person-years at risk rather than individuals at risk because the U.S. military

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14. ABSTRACT <b>Since 2010, suicide has been the second leading cause of death among U.S service members, exceeded only by war injury. Suicide mortality rates in the Army and Marine Corps have increased during the conflicts in Iraq and Afghanistan however, most active duty service members who die by suicide have never deployed. During 1998-2011, 2,990 service members died by suicide while on active duty. Numbers and rates of suicide were highest among service members who were male, in the Army, in their 20s and of white race/ethnicity. Suicide death rates were 24 percent higher among divorced/separated than single never-married service members. Firearms were the most frequently used method of suicide among both males and females. Numbers and rates of suicide among military members have increased sharply since 2005 and an increasing proportion of suicides were by firearms. When adjusted for age, rates of suicide are somewhat lower among active military members than civilians. There are not well established and clearly effective interventions to prevent suicides ? in general or specifically in a military population during wartime.</b>					
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is a dynamic cohort, i.e., every day, many individuals enter and many others leave service. Thus, in a given calendar year, there are many more individuals with any service than there are total person-years of active service; the latter was considered a more consistent measure of exposure to mortality risk across calendar years. Members of the reserve component (i.e., reserve and National Guard) were excluded from rate calculations because the start and end dates of their active duty periods were not available.

## RESULTS

### Rates, trends and demographic characteristics

During January 1998–December 2011, 2,990 service members died by suicide while on active duty (**Table 1**); the average number per year during the period was 214. Annual numbers of suicides of military members on active duty ranged from 151 (in 1999) to 296 (in 2009) among males and from 4 (in 2001) to 16 (in 2011) among females (**data not shown**).

Most service members who died by suicide were males (95%), active component members (89%), of white, non-Hispanic race/ethnicity (70%) and in their 20s (58%) (**Table 1**). The same subgroups of service members experienced the highest suicide mortality rates (calculated for the active component only). Suicide death rates were 24 percent higher among divorced/separated than single, never married active component members. The Army and Marine Corps had much higher crude (unadjusted) suicide rates than the other Service branches; these differences persisted when directly adjusted for age (**Table 2**).

Among active component members, suicide death rates were fairly stable from 1998 to 2005, increased sharply from 2005 to 2009, and then declined slightly through 2011 (**Figure 1**). Overall crude rates ranged from 10.1 (in 2002) to 19.7 (in 2009) per 100,000 p-yrs (**Figure 1**).

### Suicide method

During the period, firearms were the most frequently used method of suicide

**TABLE 1.** Demographic characteristics of active duty military members who died by suicide, active and reserve components, U.S. Armed Forces, 1998–2011

	Active and reserve components		Active component	
	No.	No.	Rate <sup>a</sup>	Rate ratio
Total	2,990	2,652	13.7	-
Sex				
Male	2,848	2,536	15.3	ref
Female	142	116	4.1	0.27
Race/ethnicity				
White, non-Hispanic	2,098	1,861	15.3	ref
Black, non-Hispanic	364	328	9.5	0.62
Other	528	463	12.5	0.82
Age				
<20	234	222	12.0	0.77
20–24	1,070	1,012	15.7	ref
25–29	660	610	15.1	0.96
30–34	355	313	11.1	0.70
35–39	369	294	12.1	0.77
40+	302	201	11.5	0.73
Marital status				
Single, never married	1,347	1,219	15.2	ref
Married	1,472	1,288	12.2	0.80
Divorced/separated/widowed	171	145	18.9	1.24

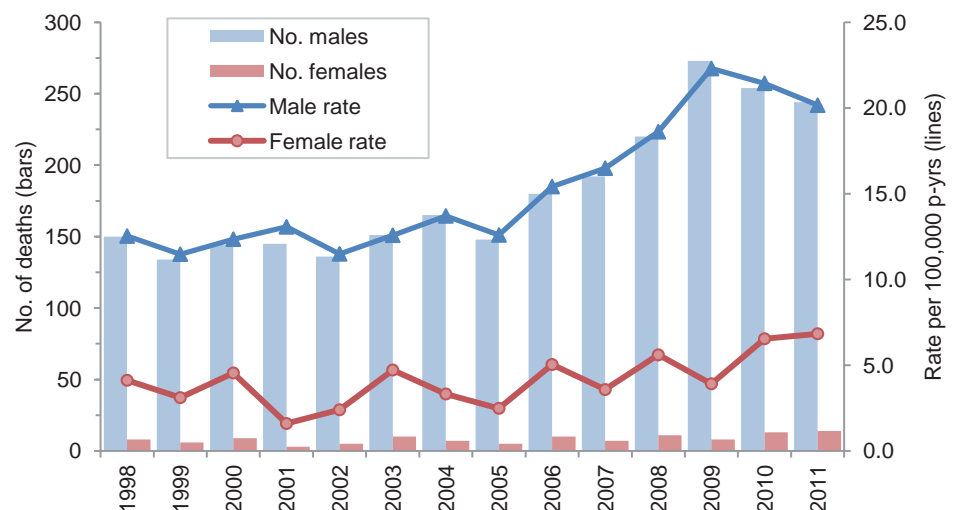
<sup>a</sup>Rate per 100,000 p-yrs; rate for active component only

by military members on active duty; firearms accounted for 62 and 46 percent of suicides among males and females, respectively (**Figure 2**). Among various military/demographic subgroups, the proportion of suicides due to firearms was highest among males in the reserve component (291/312; 70%) (**data not shown**). Firearms were the most frequently used suicide

method among males of all age groups and females 20 and older; among teenaged females, hanging/suffocation was the most frequently used method (**Figure 2**). Poisonings accounted for fewer than 9 percent and 23 percent of all suicides among male and female service members, respectively.

From 2005 through 2010, rates of suicide by firearms increased sharply among

**FIGURE 1.** Numbers and crude rates of death by suicide among active component service members (n=2,652), by gender, 1998–2011



**TABLE 2.** Suicide rates by service, crude and directly adjusted to the 2000 standard U.S. population, active component, U.S. Armed Forces, 1998-2011

	No.	Crude rate	Age-adjusted rate
Total	2,652	13.7	12.9
Army	1,188	16.9	15.4
Navy	549	11.1	11.2
Air Force	517	10.8	10.4
Marine Corps	398	15.6	13.5

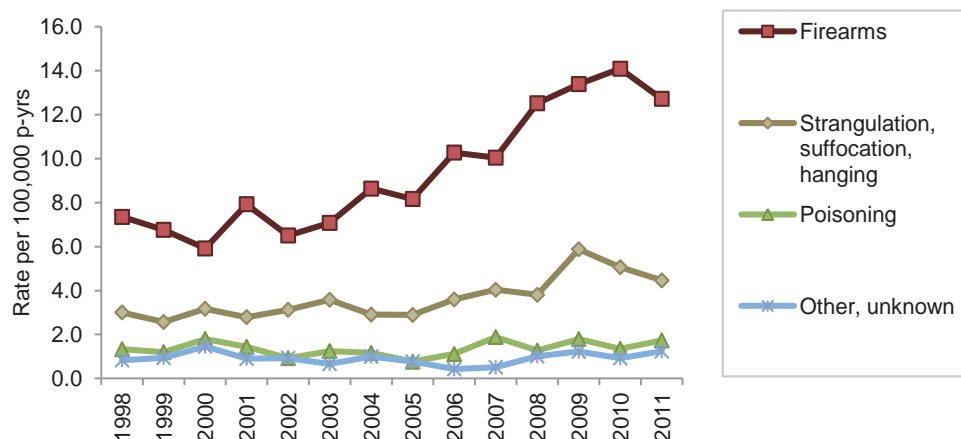
<sup>a</sup>Rate per 100,000 p-yrs

both male and female members of the active component (**Figures 3a,b**). Among active component males, the proportion of suicides by firearms was 66 percent in 2010 and 61 percent overall. Relative to the respective prior years, rates of suicide by hanging/suffocation were moderately higher after 2005 among males and after 2006-7 among females. Rates of suicide by poisoning and unknown or “other” methods (e.g., jumping) were relatively stable throughout the period.

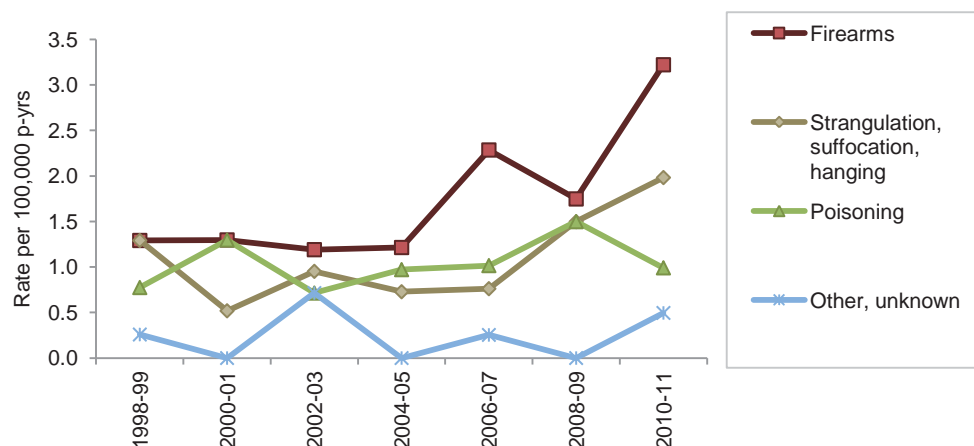
#### EDITORIAL COMMENT

This report reiterates and extends the findings of numerous other studies and reports regarding suicides among U.S.

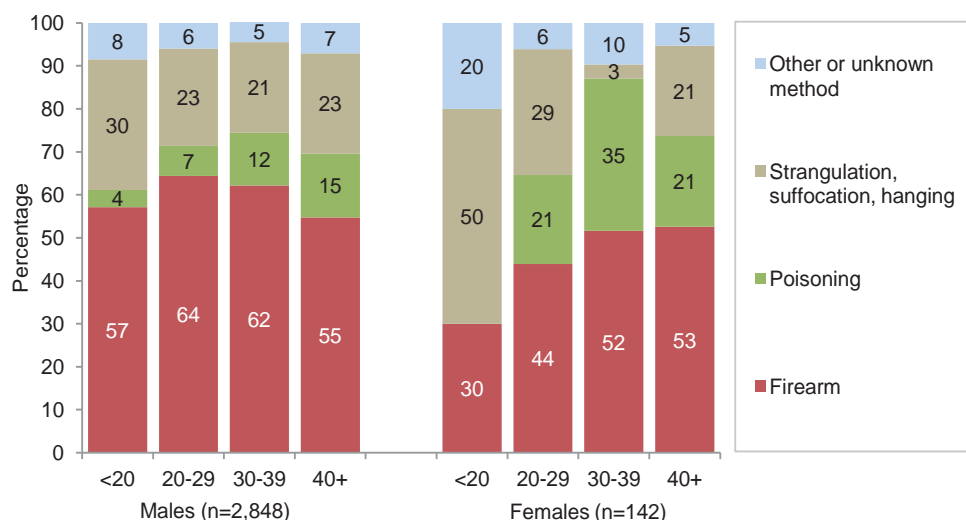
**FIGURE 3a.** Suicide death rates by method of suicide in males (n=2,536), active component, U.S. Armed Forces, 1998-2011



**FIGURE 3b.** Suicide death rates by method of suicide in females (n=116), active component, U.S. Armed Forces, 1998-2011



**FIGURE 2.** Proportions of suicides attributable to selected methods, by age group and gender, active and reserve components, 1998-2011



military members. Most notably, the report reiterates the sharp increases in numbers and rates of suicide deaths among military members – particularly among males since 2005. The findings should be and are deeply concerning to military, medical, and political leaders at the highest levels of the U.S. government.

It is useful and informative to interpret the findings of this report in relation to the contemporaneous experience of the U.S. general population. For example, from 1998 through 2011, the overall suicide rate (unadjusted) among male members of the active component of the U.S. military was 15.3 per 100,000 person-years. However, because young males comprise a much larger proportion of the military than the general U.S.



population, suicide rates in military and civilian populations are not directly comparable.<sup>11</sup> If the suicide rates that affected males in various age groups of the U.S. general population in 2010 had affected the respective age-groups of males in the active component of the U.S. military throughout the period of interest for this report, there would have been approximately 598 (23%) more suicide deaths among male military members than were observed (**calculations not shown**). The observation does not diminish the tragic impact or military public health importance of suicides among military members; rather, it highlights the extraordinary impact and public health importance of suicides among young adults – both military and civilian – in the United States in general.

Unfortunately, there are not well established and clearly effective interventions to prevent suicides – in general or specifically in a military population during wartime.

The relationship between military service and suicide is complex. For example, while many service members have mental disorders (see page 11) that place them at risk for suicide, they also have access to treatment and counseling for mental health problems, which is potentially protective.<sup>12</sup> Also, the cohesion of a military unit provides service members with “belongingness,” which may protect against suicide; however, separation from the unit (e.g., following active duty periods of Reservists) may increase feelings of isolation.<sup>13</sup>

This report confirms previous findings regarding demographic subgroups at highest risk of suicide. However, it did not find suicide rates to be comparable across service branches after adjustment for age and gender.<sup>11</sup> Of particular note in this regard, young males in the Army and Marine Corps had much higher suicide rates than similarly aged males in the Navy and Air Force (**data not shown**).

In addition, this report documents that, in recent years, increasing numbers and rates of suicides of military members have been by firearms. Suicides among female service members are relatively uncommon, and suicide methods likely vary by service. Still, it is noteworthy that, in contrast to the experience of civilian

females, firearms – not poisoning – was the leading method of suicide among female military members during the period of interest for this report.

More than half of military suicide decedents have a firearm in the home or immediate living environment.<sup>8</sup> Service members who live on a military installation are required to register personally-owned weapons. However, the 2011 National Defense Authorization Act does not allow military personnel to restrict or “collect or record any information relating to the otherwise lawful acquisition, possession, ownership, carrying, or other use of a privately-owned firearm or ammunition by a member of the Armed Forces” if that firearm is kept off base.<sup>14</sup> One report suggests that this law may be an obstacle to suicide prevention among military members because it prevents commanders from discussing privately owned weapons with at-risk service members and their families.<sup>15</sup>

The results of this report should be interpreted with consideration of its limitations. For example, the analyses were based on mortality data provided by the OAFME, which includes only those deaths that occurred during active duty military service. As such, the summaries reported here do not include the deaths of inactivated members of the Reserve and National Guard or of individuals who die by suicide after their military service has ended. In addition, service members who died from suicides – but were hospitalized before their deaths (e.g., lethal brain injury) may undergo expedited retirement processing prior to being removed from life support (e.g., for the benefit of survivors); such cases would not be included in official suicide counts.<sup>16</sup> Also, suicide rates due to various methods are subject to ascertainment bias. For example, deaths from self-inflicted gunshots may be more clearly identifiable as suicides than those by drug overdose or automobile crash, which may be misclassified as accidents.<sup>16</sup>

## REFERENCES

1. Armed Forces Health Surveillance Center. Deaths while on active duty in the U.S. Armed Forces, 1990-2011. *MSMR*. 2012 May;19(5):2-5.

2. Department of Defense Task Force on the Prevention of Suicide by Members of the Armed Forces. The Challenge and the Promise: Strengthening the Force, Preventing Suicide and Saving Lives (August 2010). Washington, DC: Department of Defense.

3. Knox KL, Pflanz S, Talcott GW, et al. The US Air Force suicide prevention program: implications for public health policy. *Am J Public Health*. 2010 Dec;100(12):2457-2463. Epub 2010 May 13.

4. O'Neil ME, Peterson K, Low A, et al, Editors. Suicide prevention interventions and referral/follow-up services: a systematic review. Washington (DC): Department of Veterans Affairs; 2012 Mar. <http://www.ncbi.nlm.nih.gov/books/NBK92635/>

5. National Institute of Mental Health (NIMH), & United States Army. Army STARRS (Army study to assess risk and resilience in service members). <http://armystarrs.org/>

6. Black SA, Galloway MS, Bell, MR, Ritchie, EC. Prevalence and risk factors associated with suicides of army soldiers 2001–2009. *Military Psychology*. 2001;23:433-451.

7. Ritchie EC. Suicide and the United States Army: Perspectives from the former psychiatry consultant to the Army Surgeon General. Cerebrum (The Dana Foundation). January 2012.<http://dana.org/news/cerebrum/detail.aspx?id=35150>

8. Kinn JT, Luxton DD, Reger MA, et al. Department of Defense Suicide Event Report: Calendar Year 2010 Annual Report. Tacoma, WA: National Center for Telehealth and Technology, Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury; 2011.

9. U.S. Army Public Health Command. Epidemiologic Report No. 14-HK-0BW9-10c, Analyses of Army Suicides 2003-2009. April 2010.

10. Bachynski KE, Canham-Chervak M, Black SA, et al. Mental health risk factors for suicides in the US Army, 2007-8. *Inj Prev*. 2012 Mar 7. [Epub ahead of print].

11. Eaton KM, Messer SC, Garvey Wilson AL, Hoge CW. Strengthening the validity of population-based suicide rate comparisons: an illustration using U.S. military and civilian data. *Suicide Life Threat Behav*. 2006 Apr;36(2):182-191.

12. Zamorski MA. Suicide prevention in military organizations. *Int Rev Psychiatry*. 2011 Apr;23(2):173-180.

13. Selby EA, Anestis MD, Bender TW, et al. Overcoming the fear of lethal injury: evaluating suicidal behavior in the military through the lens of the Interpersonal-Psychological Theory of Suicide. *Clin Psychol Rev*. 2010 Apr;30(3):298-307. Epub 2009 Dec 13.

14. National Defense Authorization Act for Fiscal Year 2011. Public Law 111-383, Section 1062. January 7, 2011. Accessed 26 June 2012 at <http://www.gpo.gov/fdsys/pkg/PLAW-111publ383/content-detail.html>

15. Center for New American Security. Policy Brief. Losing the Battle: The Challenge of Military Suicide (M.C. Harrell and N. Berglass, Oct 2011). Accessed November 2011 at [http://www.cnas.org/files/documents/publications/CNAS\\_LosingTheBattle\\_HarrellBerglass.pdf](http://www.cnas.org/files/documents/publications/CNAS_LosingTheBattle_HarrellBerglass.pdf).

16. Carr JR, Hoge CW, Gardner J, Potter R. Suicide surveillance in the U.S. Military-reporting and classification biases in rate calculations. *Suicide Life Threat Behav*. 2004 Autumn;34(3):233-41.